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FLORAE MALESIANAE PRAECURSORES XV

THE GENUS GAULTHERIA IN MALAYSIA

by

H. SLEUMER*

SUMMARY

In this revision of the Malaysian species of the genus *Gaultheria* Kalm *ex* L. 24 species and 9 varieties resp. forms are recognized. Among the new taxa described are 9 species and 1 variety. The localities of the revised material are given in detail. An index to specimens is added.

Although our knowledge of the genus *Gaultheria* has increased considerably in the last 25 years by the description of numerous new species, by local floras and partial revisions, limited to certain phytogeographic areas or to some natural groups of species, no general treatment has been undertaken, since De Candolle in 1839 enumerated the 43 species known at the time in the 'Prodromus'.

Airy-Shaw published in 1940 a 'Classification of the Asiatic species of Gaultheria', which includes a few Malaysian and North American species. He designates 5 sections (incl. 3 series), and gives keys to the species of the smaller units. After having studied all the Malaysian, Asiatic, and Australian species of *Gaultheria*, to get a view on their mutual relationships, I tried to extend Airy-Shaw's classification to the Gaultherias of Malaysia and Australia. Soon it became apparent, that his system has a weak spot in the sect. *Gymnobotrys* (G. *leucocarpa* Bl. and its allies) with so called 'eperulate' inflorescences, a character which does not exist in a proper sense, as the perulae may be reduced in number and size or are so early caducous, that they are practically absent at flowering time. Also in other characters the connection of G. *leucocarpa* Bl. with the sect. *Leucothoides* Airy-Shaw (containing the bulk of the Asiatic species) is so narrow, that a distinction of these two sections, which comprise the majority of the Malaysian Gaultherias, becomes uncertain.

It is clear, that a general system of *Gaultheria* can only be reached by a thorough knowledge of all species of the genus. To work out such a system goes beyond the scope of my actual work, and it is for that

* Flora Malesiana Foundation, Leyden.

reason, that I have omitted to give any classification into natural units here, which would be fragmentary and premature only. Working further with the genus, which has attracted me since many years, I hope to be able to publish a complete system in a future paper.

The present work gives the basis of my treatment of *Gaultheria*, to appear later in the Flora Malesiana where descriptions of all species in English language will be included; it offers a key to the species, the Latin descriptions of the new taxa., and the localities of all species, taken from a large number of herbarium specimens, which have been at my disposal through the courtesy of the Directors of the following Institutions:

Arnold Arboretum (A)	Lae (LAE)
Bogor (BO)	Melbourne (MEL)
Brisbane (BRI)	New York (NY)
Florence (FI)	Manila (PNH)
Gray Herbarium (Gil)	Stockholm (S)
Kepong (KEP)	Kuching (SAR)
Leiden (L)	Singapore (SING)
	Utrecht (U)

The material preserved in

British Museum (BM)	Kew (K)
Edinburgh (E)	Paris (P)

has been studied during a stay in these herbaria.

GAULTHERIA Kalm *ex* L.

Gaultheria Kalm *ex* Linnaeus, Sp. PI, 1: 395. 1753; Bl., Bijdr. 856. 1826; DC, Prodr. 7: 592. 1839; Miq., Fl. Ind. Bat. 2: 1055. 1859; Ann. Mus. Bot. Lugd.-Bat. 1: 40. 1863; Clarke *in* Hook., Fl. Br. Ind. 3: 456. 1882; K. & G. *in* J. As. Soc. Beng. 74, ii: 68. 1906; Koord.-Schum., Syst. Verz. fam. 233, p. 107. 1912; Koord., Exk. Fl. Java 3: 9. 1912; J. J. S. *in* K. & V., Bijdr. Booms. 13: 113. 1914; Men-., En. Philip. 3: 246. 1923; Ridl., Fl. Mai. Pen. 2: 212. 1923; Dop *in* Fl. gén. I.-C. 3: 720. 1930; Copel. f. *in* Philip. J. Sc. 47: 57. 1932; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 204. 1934; Airy-Shaw *in* Kew Bull. 1940; 306. 1941; Sleum. *in* Bot. Jahrb. 72: 211. 1942; Amshoff *in* Back., Bekn. Fl. Java (em. ed.) 7b fam. 162, p. 4. 1948.

KEY TO THE SPECIES

1. Bracteoles alternate, resp. subopposite and inserted on the pedicel in a marked distance from the calyx, or, in case of very short and condensed inflorescences or solitary nearly sessile flowers, alternate, i.e. one bracteole inserted below, the other high on the pedicel resp. nearly under the calyx.
2. Flowers in axillary (lateral) racemes.
3. Racemes rather short, few-flowered; bracts mostly small, occasionally (and only in part) in form of reduced leaves. Leaves up to 2.5 by 1.6 cm.

4. Stem ± upright. Leaves obovate-oblong or oblanceolate, (0.8—) 1—2 by 0.3—O.C(—0.7) cm. Branchlets minutely pubescent. (Formosa), Philippines (Luzon), Br. N. Borneo . . . . *l.G. bonieensis.*
4. Stem ± prostrate. Leaves ovate, (1—) 1.2—1.8(—2.5) by (0.7—)0.8—1.4(—1.6) cm. Branchlets finely pubescent and setulose, or setulose only.
5. Rhachis and pedicels finely pubescent only. (Corolla shortly 5-lobed. Filaments villose their entire length). Sumatra . . . . *2. G. atjehensis*
5. Rhachis setulose only, not pubescent. Pedicels glabrous.
6. Corolla shortly 5-lobed, densely short-pilose inside. Filaments laxly subpatent-pilose in their middle, glabrous at the base and apex. Java. . *3. G. solitaria*
C. Corolla deeply 5-cleft, completely glabrous inside. Filaments papillose. Sumatra . . . . *4. G. dialypetala*
3. Racemes ± elongate, normally many-flowered. Leaves at least 3 by 2 cm., mostly much larger.
7. Branchlets with scattered sessile glands, glabrous otherwise. Pedicels short-pilose, not glandular-pilose at all, mostly glabrescent upwards, resp. almost glabrous immediately under the calyx. Sumatra . . . . . *5. G. acroleia*
7. Branchlets finely pubescent and rather long ± patent-glandular-setulose. Pedicels pilose, with a ring- of dense, patent, glandular setulose hairs immediately under the calyx. Sumatra . . . . *6. G. barbulata*
2. Flowers axillary, in fascicles or solitary (in the latter case sometimes forming a leafed *terminal* raceme, when present in the axils of all upper decrescent leaves).
8. Flowers in few-flowered fascicles.
9. Branchlets glabrous or practically so. Reticulation not impressed on the leaf surface.
10. Leaves ovate, rounded at the base, 5.5—9.5 by 3.5—5.5 cm. Sumatra *7. G. kemiriensis*
10. Leaves elliptic to broadly ovate-lanceolate, acute at the base, 3.5—4.5 by 1.8—2.5 cm. Sumatra . . . . *8. G. losirensis*
9. Branchlets rather densely clothed with ± longish bristles. Reticulation ± distinctly impressed on the leaf surface. Sumatra . . . . *9. G. abbreviata*
8. Flowers solitary (resp. forming a terminal leafed raceme).
11. Stem weak, creeping. Each tooth of the lamina ending in a fina long-ish ± persistent bristle. (Himalaya, SE. Tibet, Assam, Upper Burma, SW. China), Sumatra, Java, Bali . . . . *10. G. nwmmularioides*
11. Stem stiff. Each tooth of the lamina thickly and ± obtusely gland-tipped.
12. Leaves lanceolate-ovate to elliptic-ovate, cuneate to rounded at the base. Fruit calyx ± red-purplish at maturity. New Guinea . . . . *11. G. mundula*
12. Leaves ovate, ± distinctly cordate at the bass. Fruit calyx white at maturity.
13. Leaves not or very slightly setose at the midrib beneath only. New Guinea. *12a. G. tanythrix* var. *tanythrix*
13. Leaves l,axly setose all over the lower surface. New Guinea. *12b. G. tanythrix* var. *setifolia*
1- Bracteoles strictly opposite, inserted on the pedicel immediately under the calyx.
14. Flowers in not or not properly leafed racemes or panicles.
15. Flowers in terminal panicles, or flowers both in terminal panicles and solitary axillary (only upper) racemes, i.e. the upper 3—4 racemes forming a panicle which may bear one or the other reduced leaf.

16. Branchlcts glandular-setose or -setulose. Leaves manifestly setose underneath.
17. Panicles stoutish and rather short. Rhachis and pedicels densely hirtellous.
18. Leaves sessile or nearly so, the base cordate. Celebes. *13a. G. celebica* var. *celebica*
18. Leaves 5—10 mm petiolate, the base ± rounded. Celebes. *13b. G. celebica* var. *petiolata*
17. Panicles slender, ± elongate. Rhachis and pedicels clothed with fine rather lax hairs. New Guinea . . . . *14. G. gracilescens*
16. Branchlets finely pubescent or glabrous.
19. Branchlets ± sharply trigonous, resp. winged by the decurrent petioles. Panicles exclusively terminal. Sumatra, Java, Bali . . . . *15. G. punctuba,*
19. Branchlets terete or nearly so, the petioles not decurrent. Both terminal panicles and solitary (upper) racemes present in the same specimen.
20. Leaves cordate at the base. New Guinea . . . . . . *16. G. arfakana*
20. Leaves broadly cuneate to rounded at the base.
21. Leaves elliptic to suborbicular, or broadly obovate-elliptic, obtusely attenuate to rounded at the apex, laxly to rather densely blackish-punctate beneath. Malay Peninsula . . . . *17. G. malayana*
21. Leaves oblong-ovate, acutely acuminate at the apex, not punctate underneath. Java?, Sumatra? . . . . *18. G. intermedia*
15. Flowers in solitary racemes only, these both in the lower and upper subsequent axils of normal leaves, the uppermost raceme often seemingly terminal.
22. Leaves pubescent beneath. Corolla pubescent.
23. Leaves (laxly) longish glandular-pubescent, especially on the lower surface and along the margin, the teeth minute, each of them ending in a longish glandular bristle-like hair. Malay Peninsula . . . . . . *19. G. hiria*
23. Leaves glabrous above, rather densely shortly non-glandular-hairy beneath, the teeth ± coarse, each of them ending in a very short thick glandular point. Sumatra . . . . *22b. G. leucocarpa* var. *hirta*
22. Leaves and corolla glabrous.
24. Leaves short-acuminate at the apex.
25. Leaves ovate-oblong or ovate-lanceolate, cuneate at the base, very laxly or not punctate underneath. Corolla subcampanulate, 3.5—4 by 3(—4) mm Celebes . . . . *20. G. viridiflora*
25. Leaves ovate to ovate-elliptic, rarely elliptic-oblong, broadly attenuate to rounded at the base, mostly manifestly laxly punctate underneath. Corolla cylindric-urceolate, 5—6(—7) by c. 3 mm.
26. Ovary densely pubescent or hirsute. New Guinea . . . . *21. G. -pullet*
26. Ovary glabrous or nearly so. New Guinea . . *21a. G. pullei* var. *leiothecci*
24. Leaves ± subcaudate- or elongate-acuminate at the apex (± ovate, the base rounded to cordate, rarely broad-attenuate).
27. Ovary densely pubescent or hirsute.
28. Inflorescence glabrous, or practically so.
29. Fruit white or rose tinged at maturity. Sumatra, Java. *22a. G. leucocarpa* f. *leucocarpa*
29. Fruit deep-red or purple to blackish at maturity. (S.W. China, Upper Burma, Indochina, Siam), Malay Peninsula, Sumatra, Java, Philippines. *22c. G. leucocarpa* f. *cumiiigiana*

28. Inflorescence densely short-pubescent.
30. Fruit white or pink tinged at maturity. Malay Peninsula, Sumatra, Java. *22d. G. leucocarpa* f. *scandens*
30. Fruit blackish purple tinged at maturity. Malay Peninsula, Sumatra, Java. *22e. G. leucocarpa* f. *melanocarpa*
27. Ovary glabrous or practically so. Philippines (Mindanao, Negros, Luzon). *22f. G. leucocarpa* var. *psilocarpa*
14. Flowers solitary in the axils of the upper leaves.
31. Flowers subsequent, i.e. in the axils of all upper (manifestly decrescent) leaves, thus a leafed raceme is formed. Branchlets somewhat winged, glabrous.
32. Ovary glabrous. New Guinea . . *23a. G. novaguineensis* **var.** *novaguineensis*
32. Ovary manifestly pubescent. New Guinea. *23b. G. novaguineensis* var. *pascua*
31. Flowers remote, i.e. in the axils of some and generally not subsequent upper (slightly or not decrescent) leaves. Branchlets terete, setulose. Sumatra. *04. G. pernettyoides*

1. GAULTHERIA BORNEENSIS Stapf.

Gaultheria borneensis Stapf *in* Trans. Linn. Soc. ser. 2. Bot. 4: 190, *t. 15 f. C 4—6.* 1894; Rendle *in* J. Bot. 34: 355. 1898; Merr. *in* Philip. J. Sc. 3: Bot. 378. 1908; Gibbs *in* J. Linn. Soc. Bot. 42: 101. 1914; Merr., En. Born. 465. 1921; En. Philip. 3-246. 1923; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934; Sleum. *in* Bot. Jahrb. 71: 141. 1940, in text. — *G. benguetensis* Copel. f. *in* Philip. J. Sc. 47; 58, *pi. 1 f. 4,5.* 1932; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934.

BR. N. BORNEO. Mt Kinabalu, 3350—3960 m, *Haviland 1085* (K, type of *G. borneensis); Gibbs 4421; Clemens 277S3, 23861, 29954, 32328, 50807, 51405.*

PHILIPPINES. Luzon: Mountain Prov., 1800—3000m: Benguet, *Loher 3755, 3756;* Pauai to Baguio, *Merrill 4796* (K; PNH, type of *G. benguetensis,* f; US, not seen) ; Mt Pauai, *B. Sci. 4283, 4286 Means; F.B. 14438 Darling* (cit. Copeland, not seen); *B. Sci. 8421 McGregor; Merrill 710; Clemens 9206* (cit. Copeland, not seeni ; *B. Sci. 31839 Santos; B. Sci. 82377 Quisumbing & Sulit;* Mt Pulog, *B. Sci 44977 Ramos & Edaño; PNH 4345 Celestino;* Lepanto, *B. Sci. 5955 Ramos;* Mt Data, *Clemens 16393* (cit. Copeland, not seen), *18778.* "N.W. Central Luzon", *Whitehead s.n.*

2. GAULTHERIA ATJEHENSIS J. J. S.

Gaultheria atjehensis J. J. Smith *in* Fedde Rep. 35: 293. 1934 *(atjehense) ;* Steen. *in* Bull. Jard. Bot. Btzg 13: 205. 1934; Airy-Shaw *in* Kew Bull. 1940: 313. 1941; *I.e.* 158, /• *3.* 1948.

SUMATRA. Atjeh: Bur ni Telong, 2500 m, *Frey-Wysslivg 27* (BO, type; L) ; Mt Kemiri, E slope, 2900—3314 m, *van Steenis 9580;* Mt Losir, 2950—3500 m, *van steenis 8643.*

3. Gaullheria solitaria Sleum., *nov. spec.*

j- Fruticulus, ramulis gracilibus (2 mm diam.), ut videtur, prostratis. famulus unicus 25 cm longus extat, teres, in sicco rubescens, laxe setulosus el basibus setularum tantum permanentibus nigro-punctatus, ceterum

apicem versus laxe brevissime pubescens. Folia ovata, apice breviter acuminata, glandula crassa prorumpente terminata, basi rotundata, ± coriacea, in sicco supra nigrescenti-brunnea, subtus dilute castanea, utrinque subnitida, supra glabra, subtus passim caduce brevissime setulosa seu punctata, ± regulariter serrata, dentibus glandulosis obtusis 1—2 mm distantibus 0,3—0.5 mm altis, haud ciliato-setulosis, 1,8—2,5 cm longa, 1,2—1,5 cm lata, costa supra immersa, subtus prominente, nervis lateralibus e basi et inieriore tertio costae enascentibus pinnatis utroque latere 3 alte ascendentibus, supra levissime vel haud impressis, subtus prominulis, venis ± transversis subtus tantum prominulis, rete venularum laxo supra leviter impresso, subtus prominulo; petiolus crassiusculus, setulosus, c. 2 cm longus. Racemi solitarii, ut videtur ex axillis 2 ultimis enascentes (apice ramuli destructo haud viso), c. 2—3 cm longi, basi pluribracteati, 6—8-flori. Rhachis crassiuscula, laxe setulosa. Pedicelli glabri, c. 3—5 mm longi, in axilla bracteae foliaceae 3—6 mm longae, 2—8 mm latae (id est, in axilla foliorum apicem inflorescentiae versus gradatim reductorum) instructi, supra basin vel fere ad medium bracteolis 2 suboppositis ovato-oblongis parvulis ornati, ceterum in apice, sed paullo a calyce distanter bracteola minuta praediti. Calyx 3 mm longus, lobis ovato-acuminatis c. 2 mm longis, extus glabris, intus puberulis, ciliolatis. Corolla urceolata, c. 5,5 mm longa, extus glabra, intus (certe infra medium) manifeste puberula, lobis 1—1,5 mm longis. Stamina 10; filamenta linearia, in media parte ± patenter subvilloso-pilosa ceterum glabra, c. 2 mm longa; antherae haud bene evolutae. Ovarium glabrum vel parcissime pilosum; stylus glaber 2,5 mm longus.

JAVA. Pasuruan: G. Kembar (G. Ardjuno), Vaccinietum, 2900 m, fl. 7-1918, *Bremekamp s.n.* (BO, type; L, fragm.).

4. **Gaultheria dialypetala** Sleum., *nov. spec.*

Frutex prostratus, ramis pluribus 30—40 cm longis, e radice tuberculato-incrassata abeuntibus, ramulis teretibus, gracilibus (1—2 mm diam.), parum ramosis, per totam longitudinem sat dense pilis setosis ruf is ± patentibus tenuibus c. 1,5 mm longis eglandulosis obsitis, haud puberulis, sat dense foliatis. Folia ovata, apice breviter acuminata, glandula prorumpente valde crassa terminata, basi rotundata vel latissime attenuata, coriacea, supra in sicco brunneo-nigrescentia, subtus castanea, utrinque subnitida, supra, glabra, subtus laxe brevissime caduce setulosa vel nigropunctata, ± regulariter serrata, dentibus prorsus versis caduce setuloso-ciliatis 1—2 mm distantibus vix 0,5 mm altis, margine paullo revoluta, (1—)1,2—1,8(—2) cm longa, 0,8—1,3 cm lata, costa supra leviter imprestsa, subtus bene prominente, nervis lateralibus c. 3(—4) paribus alte ascendentibus supra parum, subtus magis conspicuis, rete venarum subtus prominulo; petiolus laxe setulosus 1—2 mm longus, crassiusculus. Racemi ex axillis ultimis 3—5 orti, abbreviati, inferiores 3—5-flori, summi 2-flori vel ad florem unicum reducti. Rhachis 0,5—1,5 cm longa, glabra, basi bracteis parvis 2—3 instructa. Pedicelli glabri, 1—2(—3) mm longi, basi bractea oblonga ciliolata c. 2 mm longa, superne bracteolis 2 ovatis alternantibus a calyce breviter, sed distincte remotis instructi. Calyx 4 mm longus, lobis ovato-acuminatis, acutiusculis, ciliolatis, extus glabris, intus secus medianam puberulis, c. 2,5 mm longis. Corolla alba, urceolata, paullo 5-angulata, utrinque glabra, 4 mm longa, initio, ut videtur, breviter, sub plena anthesi profundius 5-lobata, corollis denique ad 3/4 longitudinis fissis. Stamina haud bene evoluta; filamenta (possibiliter haud normalia) anguste subulata, papillosa; antherae haud visae. Ovarium sat dense flavido-pilosum; stylus 3 mm longus, pilis patentibus nonnullis instructus.

SUMATRA. West coast: top G. Talakmau (Mt Ophir), boulder plain, common, 2900m, fl. white, 2-6-1917, *Biinnemeijer 978* (BO, type; L, fragm.).

NOTE. In accordance with other cases of deeply split corollas in Ericaceae, especially in *Vactinium*, which apparently are due to insects (galls), I suspect, that in *G. dialypetala* also galls might be the cause of the anomalies noticed in the corollas and stamens.

5. **Gaultheria acroleia** Sleum., *nov. spec.*

Frutex. Ramuli apice subangulati vel applanati, deorsum cito teretiusculi, sparse glandulis sessilibus, id est basibus setularum caducarum persistentibus adspersi, ceterum omnino glabri. Folia subovato-elliptica vel subovato-oblonga, apice sensim sat breviter acuminata, glandula terminali crassa instructa, basi late cuneata interdum subrotundata, subcoriacea usque coriacea, rigiduia, opaca, supra m sicco* olivaceo-brunnea, subtus pallidiora rubescenti-brunnea, regulariter serrulata, dentibus ± 1 mm altis et 1,5—2(—3) mm distantibus caduce setuloso-ciliatis, subobtusis, supra glabra, subtus laxe usque subdense glanduloso-punctata, (3—)4—7(—8) cm longa, (2—)2,2—3(—3,5) cm lata, costa, nervis venisque supra ± distincte impressis, costa suDtus valde prominente, nervis lateralibus utroque latere 5(—6) curvatis alte ascendentibus praeter marginem anastomosantibus subtus prominentibus, venis ± transversis subtus parum elevatis, venulis subobscuris; petiolus supra canaliculatus, glaber, 7—9 mm longus. Racemi ex axillis superioribus singuli, basi bracteis 2 ovatis vel ovato-oblongis acutiusculis subcoriaceis subglabris c. 4 mm longis et 2,5 mm latis mox caducis fulti, (3—) 3,5—5 cm longi, patulo-erecti, sat multiflori. Rhachis rigidiuscula, basi 1,5 mm diam., densissime pilis tenuissimis crispulis albido-flavescentibus apice minute caduce glanduliferis instructa, pilis setosis glanduliferis nullis. Pedicelli subgraciles, inferne sicut rhachis pubescentes, superne saepius manifeste glabrescentes itaque infra calycem omnino glabri, sub anthesi 6—8 mm longi, postea elongati, basi bractea ovato-oblonga pubescente 2—3 mm longa, 1,5—2 mm lata, m infenore tercio usque ad medium bracteolis 2 suboppositis ovato-lanceolatis, pubescentibus, c. 2 mm longis et 1 mm latis instructi. Calyx 2,5 mm longus, lobis ovatis subacutis dorso glabris, intus parce Pubescentibus, ciiiatis. Corolla urceolata, alba vel rosacea, extus glabra, intus laxe pubescens, c. 5 mm longa, 2,5 mm diam., apice paullo contracta et brevissime 5-loba. Stamina 10, dimidium corollae aequantia; filamenta

supra basin dilatata, papillosa, inferne laxe pubescentia; antherae ovato-oblongae, tubulis brevissimis sat longe (c. 0.7 mm) biaristatis. Ovarium dense pubescens; stylus 2,5 mm longus, inferne pubescens, superne glaber. Fructus subgiobosus, c. 6 mm diam., calyce carnosulo atrescente.

SUMATRA. Atjeh: Gajo and Alas Lands, Mt Kemiri, E. slope, bivouac 2 to summit, 2900—3314 m, fl., fr. imm. 7-3-1937, *van Steenis 96H* (A, K; L, type); Putjuk Angasan, 2500 m, *van Steenis 8^18;* Mt Losir, 2250—3500 m, *van Steenis SA85, 8570, 8606, 8680.*

6. Gaultheria barbulata Sleum., *nov. spec.*

Frutex. Ramuli apice paullo applanati, ceterum subteretes, sat dense brevissime albido-pubescentes et subpatenter longe glanduloso-subsetoso-pilosi, in sicco saturate rubro-brunnei. Folia ovata vel oblongo-ovata, apice breviter sat abrupte acuminata, subacuta, glandula minuta terminata, basi in petiolum contracta, subtruncato-rotundata vel -subcordata, firmule subcoriacea, utrinque opaca, in sicco castanea, subtus paullo pallidiora, ad costam nervosque utrinque brevissime pubescentia, ceterum supra glabra, subtus initio per totam faciem subdense, ad costam et nervos densius pilis setosis brevibus basi incrassatis instructa, demum basibus setularum persistentibus manifeste punctata, regulariter serrulata, dentibus caduce glanduloso-ciliatis 0,5 mm altis et ± 1 mm distantibus, (3—) 3,5—6 cm longa, (2—)2,5—3,5 cm lata, costa supra bene impressa, subtus crasse prominente, nervis lateralibus utroque latere 4—5 longe arcuato-ascendentibus, supra sicut venae in sicco levissime immersis, subtus elevatis, venis transversis subtus conspicuis, venulis minus distinctis; petiolus setulosus, 3—6 mm longus. Racemi axillares simplices subgraciles 4—8 (—10) cm longi, multiflori. Rhachis dense pilis albidis vel flavescentibus ± patentibus brevissimis laxeque pilis setulosis (1—1,5 mm longis) glanduliieris instructa, basi bracteis paucis e±to caducis instructa, florendi ternpore quasi eperulata. Pedicelli sat graciles 6—8 mm longi, dense brevissime pilosi laxeque glanduloso-setuliferi, basi bractea ovato-lanceolata acuta pubescente c. 2.5 mm longa fulti, in medio vel supra medium bracteolis 2 ± distincte alternantibus ovato-acuminatis pubescentibus c. 1,5 mm longis, a calyce certe 1 mm (vel longius) remotis instructi, infra calycem annulo pilis glanduliferis densissimis formato quasi barbulati. Calyx 2 mm, lobis ovatis, utrinque dense subadpresse pubescentibus, haud glanduloso-pilosis. Corolla urceolato-cylindrica, extus glabra, intus patenter pilosula, c. 6 mm longa, 3,5 mm diam.. brevissime 5-lobata. Stamina 10; filamenta supra basin dilatata, inferne laxissime pilosula, ceterum papillosa, 2,5 mm longa; antherae late oblongae, curvatae, c. 1 mm longae, tubulis brevissimis apice longe (c. 1 mm) biaristatis. Ovarium dense albido-erecto-pilosum; stylus sat dense patenter pilosus, in summo apice tantum glaber, c. 3 mm longus. Fructus haud visus.

SUMATRA. Atjeh: Gajo and Alas Lands, Putjuk Angasan, bivouac 1—2, 2500m, fl. 28-1-1937, *van Steenis 837k* (L. type).

7. Gaultheria kemiriensis Sleum., *nov. spec.*

Frutex. Ramuli graciles subangulati, in sicco saturate rubrobrunnei, glabri. Folia, ovata, apice breviter acuminata, subacuta, glandula crassa terminata, basi ± rotundata, coriacea, supra in sicco olivaceo-brunnescentia, subtus rubescenti-brunnea, opaca, supra glabra, subtus sat dense punctulata ceterum glabra, adpresse glanduloso-serrulata, dentibus prorsus versis vix 0,2—0,4 mm altis, 1,5—3 mm distantibus setula caduca terminatis, 5,5—9,5(—10,5) cm longa, 3,5—5,5(—6) cm lata, costa supra leviter impressa, subtus crasse prominente, nervis lateralibus utroque latere 2(—3), infimis e laminae basi, superioribus supra basin a costa abeuntibus alteque usque ad apicem ascendentibus, supra leviter impressis, subtus bene prominentibus, venis transversis cum venulis valde laxe reticulatis subtus tantum elevatis; petiolus 4—5 mm longus. Fasciculi axillares 3—7-flori, basi multibracteati. Pedicelli sat graciles, sub anthesi 3—4 mm longi, postea usque ad 7 mm elongati, supra basin bracteolis 2 ovato-acuminatis instructi. Calyx usque ad medium 5-partitus, 2,5—3 mm longus, glaber, lobis acutis. Corolla breviter urceolata, viridis, glabra, c. 4 mm longa, 3 mm diam., breviter 5-loba. Stamina, haud bene evoluta; filamenta papillosa, c. 1,5 mm longa; antherae reductae, apice 4-aristatae. Ovarium dense flavido-pilosum; stylus glaber 3 mm longus.

SUMATRA. Atjeh: Gajo & Alas Lands, Mt Kemiri, E. slope, 2900—3314 m, fl. 7-3-1937, *van Steenis 965i* (BO, type; L) ; ibid., *van Steenis 96k3;* Mt Losir, bivouac 4 to 5, waterdivide, 2700—2800 m, *van Steenis 8535.*

8. Gaultheria losirensis Sleum., *nov. spec.*

Frutex. Ramuli leviter angulati, glaberrimi, in sicco saturate rubrobrunnei. Folia elliptica usque late ovato-lanceolata, apice acuminata, subacuta, glandula crassa obtusa terminata, basi in petiolum cuneata, coriacea, supra glabra, subtus laxe usque subdense nigro-punctulata, in sicco brunnea, subtus paullo pallidiora, argute minuteque serrata, dentibus vix 0,5 mm altis caduce setiferis 2—3 mm distantibus, 3,5—4,5 cm longa, 1,8—2,5 cm lata, costa supra subimpressa, subtus prominente, nervis lateralibus utroque latere 2, extremis e basi orientibus praeter marginem excurrentibus, superioribus paullo supra basin laminae ortis usque ad laminae apicem ascendentibus, omnibus supra leviter immersis, subtus prominulis, venis sive nervis superioribus a costa transverse abeuntibus pluribus, cum venulis valde laxe reticulatis utrinque ± inconspicuis; petiolus robustus, 3—4 mm longus, c. 1,5 mm diam. Fasciculi axillares 6—8-flori, basi bracteis bracteolisque numerosis ovato-acutis ciliatis ceterum glabris instructi. Pedicelli crassiusculi, glabri, 6—8 mm longi. Calyx profunde 5-lobus, glaber, c. 2,5 mm longus, lobis acutis apicem versus ciliolatis. Corolla et stamina haud visa. Ovarium sat dense flavescenti-hirtum; stylus glaber, c. 3 mm longus. Fructus ignotus.

SUMATRA. Atjeh: Gajo and Alas Lands, Mt Losir, central top, bivouac 6, summit zone, 3300—3460 m, defl. 2-2-1937, *van Steenis 8568* (L, type).

9. GAULTHERIA ABBREVIATA J. J. S.

Gaultheria abbreviata J. J. Smith *in* Pedde Rep. 35: 292. 1934; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 204. 1934; Airy-Shaw *in* Kew Bull. 1940; 311. 1941; *l.e.* 158, *f.l.* 1948.

SUMATRA. Eastcoast: G. Pinto, top, 2200 m, *Lorzing 8273.* West coast: G. Talakmau, NW slope, 1800 m, *Biinnemeijer 963;* G. Singgalang, above 2000 m, *Beccari* a. 1878, *Lcefmans 46;* ibid., top, 2800m, *Docters van Leeuwen 3983* (A, BO; L, type).

10. GAULTHERIA NUMMULARIOIDES D. Don.

Gaultheria nummularioides D. Don, Prodr. Fl. Nepal. 150. 1825; Wall., Cat. n. 1524. 1829; G. Don, Gen. Syst. 3: 839. 1834; Royle, 111. 260, *t. 63 f. 2 a-e.* 1835; Clarke *in* Hook, f., Fl. Br. Ind. 3: 457. 1882; Hallier f. *in* Med. Rijksherb. 12: 28. 1912; Koord., Exk. Fl. Java 3: 10. 1912; Koord.-Schum., Syst. Verz. fam. 233, p. 108. 1912; J. J. S. *in* K. & V., Bijdr. Booms. 13: 114. 1914; Ridl. *in* J. Fed. Mai. St. Mus. 8(4) : 57. 1917; Koord., Fl. Tjib. fam. 233, p. 6. 1918; Doct. v. Leeuwen *in* Trop. Natuur. 13: 99. /. *2.* 1924; Sp. Moore *in* J. Bot. 63: Suppl. 57. 1925; Hochr. *in* Candollea 2: 49G. 1925; Heyne, Nutt. PI. 1218. 1927; Doct. v. Leeuwen, Pangrango 202, /. *45.* 1933; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934; J. J. S. *in* Merr. *in* Contr. Arn. Arb. 8: 127. 1934; Kanj. etc., Fl. Assam 3: 148. 1939; Airy-Shaw *in* Kew Bull. 1940: 314. 1941; Amshoff *in* Back., Bekn. Fl. Java (em. ed.) 7b fam. 162, p. 5. 1948. — *G. repens* Bl., Bijdr. 857. 1826; G. Don, Gen. Syst. 3: 839. 1834; DC, Prodr. 7: 593. 1839; Hassk., Cat. Hort. Btzg 160. 1844; Zoll. *in* Nat. Geneesk. Arch. N.I. 2: 9. 1845; Miq., Ann. Mus. Bot. Lugd.-Bat. 1: 41. 1863; *nee* Rafin. 1828.—*G. nummulariae* DC, Prodr. 7: 592. 1839.—*G. trichophylla (non* Royle *in* DC.) Hassk., Retzia (ed. 1) 1: 108. 1855; *in* Nat. Tijd. N.I. 10: 108. 1856; Retzia ed. nov. 1: 148. 1858; Miq., Fl. Ind. Bat. 2: 1056. 1859; Koord. *in* Nat. Tijd. N.I. 60: 265. *1901.—Pernettya repens* (Bl.) Zoll. & Mor., Syst. Verz. Zoll. 42. 1846; Zoll., Verz. 2: 138. 1854; Miq., Fl. Ind. Bat. 2: 1054. 1859.—*Brossaea nummularioides* (D. Don) O. Kuntze, Rev. Gen. PI. 2: 388. 1891, *incl. a normal-is, jj glauca* O. Ktze.

SUMATRA. Atjeh: Gajo Lands, Mt Losir, 2900—3460 m, *van Steenis 8647, 9589.* Eastcoast: G. Sinabung, 2100—2560m, *Lorzing 8148; For. Dep. F.M.S. 25092 Symington; Bartlett 8638; Bangham 1178.* West coast: G. Kerintji, 2300—3350 m, *Robinson & Kloss s.n.; Jaeobson 2474; Holttum SF 26232; Biinnemeijer 10033, 10393;* G. Merapi, 2640 m, *Sehiffner 2355;* G. Talang, 2590 m, *Biinnemeijer 5520;* G. Singgalang, 2800 m, *Beccari P.S. 338;* G. Talakmau (Ophir) 2700—2800 m, *Homer s.n., Biinnemeijer 852, 852 a.* Palembang: Mt Dempo, 2745—3100 m, *Forbes 2443; ale Voogd 1561.*

JAVA. Djakarta/Preanger: Mt Gedeh, 2135—2960 m, *Reinwardt s.n.; Blume s.n.* (L, type of *G. repens) ; O. Kiintze 4648; Hallier 437; van Steenis 1234C>, 17560; de Voogd 737; Koorders 26080; Hub. Winlder 1S20; Docters van Leeuwen 4185; Yates 2796; Clemens 30428; Lam 406; Moiler 4;* Mt Pangrango, 2500—3000 m, *Kurz 1503; Sapiin 2454; Sehiffner 2379; Bur ok s.n.; van Steenis 17613; J. J. Smith s.n.; Beccari s.n.; Koorders 31768; Zollinger 437; Docters van Leeuwen 153, 272;* Mt Malabar, 2135 m, *Anderson 150;* Tjibodas, *Scheffer s.n.; Raap 815, Sapiin 524;* Sindanglaya, *Hullet s.n.;* "W. Java", *Lobb 40; Horsfield s.n.; Leschenault s.n.; Kollmann*

s.n.; Zollinger 2126; Warburg 3314. Banjumas: G. Slamat, 3100m, *Backer 523.* Semarang: G. Murjo, 700 m, *Kostermans 6340;* G. Unggaran, *Junghuhn s.n.* Kedu: Djieng, 2000—2150 m, *Backer 21582; van Slooten 373; Karsten 61; O. Kuntze 5762;* G. Merbabu, 3100 m, *Docters van Leeuwen s.n.;* G. Merapi, *Junghuhn 93.* Madiun: G. Lawu, 2900—3200m, *van Slooten 2563; Coert 265, 1053; Elbert 72.* Malang: G. Lawangan, 1500 m, *Molhuysen s.n.; Mousset 844;* G. Panadjaan, 2600 m, *van Slooten 2356;* G. Kawi, *Docters van Leeuwen 12328;* G. Tengger, *Kobus s.n.;* G. Tengger-G. Kembang, *Koorders 37521; G.* Welirang (Ardjuno), 3000—3300 m, *van Steenis 7022; Laitterbach 6152.* Besuki: G. Merapi, Idjen, 2600m, *Koorders 43168.*

BALI. G. Agung, *de Voogd 1943.*

11. GAULTHERIA MUNDULA F. V. M.

Gaultheria mundula F. von Mueller *in* Trans. R. Soc. Viet. n.s. 1 (2) : 21. 1889; Diels *in* Bot. Jahrb. 62: 437. 1929; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934; Sleum. *in* Bot. Jahrb. 72: 214. 1942.—*Diplycosia mundula* (F. v. M.) Schltr. *in* Bot. Jahrb. 55: 162. 1918; Lane-Poole. For. Res. 130. 1925; White & Francis in Proc. R. Soc. Queensl. 39: 68. 1928.

NEW GUINEA. Central Highl.: Bismarck Mts, Wahgi valley watershed, 1585—2745m, *Gilliard s.n.;* Mt Wilhelm, 3350—4570m, *Sample & Rayner.* NE. New G.: Morobe Distr., Mt Saruwaged 2000—4500 m, *Keysser 18; Lane-Poole 504; Clemens 5890, 5891, 5892, 7289 A, 9505 A, 9552 A, 9598, 9.958 A;* Rawlinson Range, 2135—3655m, *Clemens 12319, 41140, 41389.* SE. New G.: Centr. Distr., Summit of Mt Victoria, *McGregor s.n.,* anno 1889 (BRI; MEL, type); summit of Owen Stanley Range, *McGregor s.n.,* anno 1889; Mt Knutsford, *McGregor s.n.,* anno 1889; Mt Scratchley, 3300—4300 m, *Gildianetti s.n.;* Wharton Range, 3700 m, *Giulianetti & English s.n.;* ibid., Murray Pass, 2800—2840 m, *Brass 4183, 4186, 4745;* Mt Albert Edward, 3680—3810 m, Brass *4213, 4280, 4497.*

12. GAULTHERIA TANYTHRIX Sleum.

Gaultheria tanythrix Sleumer *in* Bot. Jahrb. 72: 214. 1942.

12a. var. TANYTHRIX.

NW. NEW GUINEA. Oranje Mts, Mt Wilhelmina, 3750—3800 m, *Brass & Meijer Drees 10128* (A; L, type), *10342.*

12b. var. SETIFOLIA Sleum.

var. *sctifolia* Sleumer *in* Bot. Jahrb. 72: 215. 1942.

NW. NEW GUINEA. Oranje Mts, Lake Habbema, 3225 m, *Brass 9223* (A, BM; L, type).

13. GAULTHERIA CELEBICA J. J. S.

Gaultheria celebica J. J. Smith *in* Bull. Jard. Bot. Btzg III, 1: 404, *I. 52.* 1920; Steen. *I.e.* Ill, 13: 205. 1934.

13a. var. CELEBICA.

C. CELEBES. Quarles Mts, G. Sinadji, *Rachmat 887* (BO, type; L).

13b. var. PETIOLATA J. J. S.

var. *petiolata 3.3.* Smith *in* Fedde Rep. 30: 171. 1932; Bot. Jahrb. 68: 204. 1937.

CELEBES. C. Celebes: Masamba, between Tomadu and Sing Kalong, 1000—1400 m, *Eyma 14.62.* Enrekang, ridge Batubollong-Madjadja, 2900 m, *Eyma 958;* ibid., Pokapindjang-Tinabang, 2800—3000 m, *Eyma 626;* B. Poka Pindjang, 2700 m, *Kjellberg 3918;* Rante Lemo, 1800 m, *Kjellberg H85.* SW. Celebes: G. Bantaeng (Peak of Bonthain), L400—2890 m, *Bünnemeijer 12242, 12394* (BO, type; K, L;.

14. Gaultheria gracilescens Sleum., *nov. spec.*

Frutex. Ramuli brevissime sat dense pubescentes et patenter setulosi, teretes, in sicco brunneo-rubescentes. Folia ovata usque oblongo-ovata, apice breviter subacute acuminata, glandula terminali minuta instructa, basi leviter cordata, subcoriacea, in sicco brunnescentia et opaca, supra costa brevissime pubescente excepta glabra, subtus sat dense breviter setulosa, vel demum setulis basi excepta caducis punctata, regulariter denseque serrulata, dentibus vix 0,5 mm altis initio seta gracillima terminatis, (2—)2,5—4,5(—5) cm longa, (1,5—)1,8—2,5(—2,8) cm lata, costa nervisque supra levissime impressis vel subobscuris, subtus distinctis, costa subtus crasse prominente, nervis lateralibus utroque latere 2—3 alte curvato-aseendentibus prope marginem inter sese conjunctis, inferioribus 1—2 e laminae basi, superioribus 1—2 supra basin orientibus, nervis aliis transverse a costa. abeuntibus seu venis pluribus cum venulis subtus: rete laxum prominulum formantibus; petiolus nigrescens, pubescens, laxe setulosus, parum applanatus, 1,5—2 mm longus, 1—1,5 mm crassus. Paniculae terminales, e racemis ex axillis foliorum cito decrescentium ortis compositae, interdum racemis ex axillis foliorum normalium inferiorum enascentibus additis, racemis ipsis ± patentibus subdensifloris gracilibus, (4—)5—12 cm longis. Rhaches 0,5—0,7 mm diam., dense breviter subflavescenti-pubescentes laxeque setulosae. Pedicelli dense flavido-pubescentes, c. 3 mm longi. Bracteae ovatae, subacuminatae, pubescentes, 2—3 mm longae. Bracteolae infra calycem insertae, subovato-semiorbiculatae, pubescentes, c. 1,5 mm longae. Calyx sat profunde 5-partitus, 2,5 mm longus, dorso brevissime pubescens, lobis ovato-acutis dense ciliatis. Corolla subcylindrico-urceolata, 4,5—5 mm longa, c. 2,5 mm diam., ore parum contracta, glabra. Stamina 10, c. 2,5 mm longa; filamenta papillosa; antherae ovato-oblongae, tubulis brevissimis longe (c. 0,7 mm) biaristatis. Ovarium albido-flavescenti-hirtum; stylus glaber, 3 mm longus. Fructus maturus haud visus.

NW. NEW GUINEA. Wissel Lake region, environs of Post, fl. 5/6-1939, *Eyma 4937* (A; L, type; SING)) ibid., south border of Lake Paniai, from Kotebu to Tore River and Lake, 1750 m, *Eyma 4480.*

15. GAULTHERIA PUNCTATA Bl.

Gaultheria punctata BL, Bijdr. 856. 1826; G. Don, Gen. Syst. 3: 840'. 1834; DC, Prodr. 7: 593. 1839; Hassk., Cat. Hort. Btzg 160. 1844; Zoll. *in* Nat. Geneesk. Arch. N.I. 2: 9. 1845; Syst. Verz. 2: 138. 1854; Miq., Fl. Ind. Bat. 2: 1055. 1859; Ann. Mus. Bot. Lugd.-Bat. 1: 41. 1863; Boerl. *in* Veth, Midden Sumatra 22. 1884; Gresh., Schets. 33, *fig.* 1894; Koord. *in* Teysmannia 10: 454. 1899; Sp. Moore *in 3.* Bot. 63: Suppl. 57. 1925, *non* Kurz *in* J. As. Soc. Beng. 46, ii: 215. 1877; For. Fl. Br. Burma 2: 92. 1877, *non* H. & A. *in* Hook., J. Bot. 1: 281. 1834.—*G. fragrantissima (non* Wall.) Moritzi, Syst. Verz. Zoll. 42. 1846; Koord.-Schum., Syst. Verz. fam. 233, p. 107. 1912; Koord., Exk. Fl. Java 3: 10. 1912; Ridl. *in* J. Fed. Mai. St. Mus. 8 (4): 57. 1917; Koord., Fl. Tjib., Fam. 233, p. 5. 1918; de Voogd *in* Trop. Natuur 23: 82, /. *1.* 1934; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 2C6. 1934; Merr. *in* Not. Nat. Ac. Nat. Sc. Philad. 47: 2. 1940.—*G. fragrantissima* Wall. var. *punctata* (Bl.) J. J. S. *in* K. & V., Bijdr. Booms. 13: 121. 1914; Hochr. *in* Candollea 2: 495. 1925; Heyne, Nutt. PI. 1217. 1927; Doct. v. Leeuwen, Pangrango 198, /. *b2.* 1933; J. J. S. *in* Merr. *in* Contr. Arn. Arb. 8: 127. 1934; Amshoff *in* Back., Bekn. Fl. Java (em. ed.) 7b, fam. 162, p. 5. 1948.—*Brossaea fragrantissima (non* Wall.) O. Ktze, Rev. Gen. PI. 2: 388. 1891.

SUMATRA. Atjeh: Bur ni Telong, 1800—2500m, *Frey-Wyssling 28; van Steenis 6331;* Laut Pupandji, 2050 m, *van Steenis 6523;* G. Peëut Sago, 2300 *m, Gall 86.* Eastcoast: Mt Sibajak, 1280—1980 m, *Yates 1974; Bangham 1026; Docters van Leeuiven 12871;* Takigeum, 1220—1525 m, *Bangham 677;* Redelong Volcano, 1095—1830 m, *Bangham 908.* Tapanuli: Summit of Dolok Surunga, Habinsaran, *Bartlett 8028.* Westcoast: G. Merapi, 2200—2600 m, *Schiffner 2357, 2376; Bunnemeijer 4734, 4905;* G. Singgalang, 2400 m, *Matthew s.n.; Yates 2465; Beccari P.S. 22k;* G. Kerintji, 2225—3700 m, *Jacobson 2467; Bünnemeijer 10023, 10024, 10150; Robinson & Kloss s.n.; G.* Talakmau 2400—2800 ra, *Bünnemeijer 835, 842; G.* Talang, 2350—2400m, *Bünnemeijer 5219, 5508.* Palembang: Mt Dempo, 2500m, *Forbes 2439.* Benkulen: Lebong-, Pasir lebar, 1000m, *de Voogd 1125;* G. Pesagi, 2230m, *van Steenis 3678.* Lampong: Mt Besagi, 2140m, *Forbes 2055.* Without locality: *Korthals s.n.*

JAVA. Djakarta/Preanger: Mt Gede, *Blume s.n.* (L, type of *G. punctata)* ; ibid., 2500—2900 m, *Hub. Winkler 1818; Schiffner 2360; Docters van Leeuwen 8714, 12961; Kurz 2373; Koorders 15612, 15639, 25987; Lam 413; Palmer & Bryant 891; Clemens 30429; Yates 2802; Backer 3289, 31302; Hallier 436, 456; O. Kuntze 4644; van Steenis 17568; Brascamp s.n.;* Mt Papandajan, 2000—2400 m, *Korthals s.n.; Koorders 4-2550; Backer 5511; Kjellberg s.n.;* Tjibodas, 2200—2600 m, *Koorders 9691, 31955; Scheffer s.n.;* Mt Pangrango, 2300—2500 m, *Moller 51; Koorders 31825; van Steenis 17617; Burck s.n.; de Monchy s.n.; Beccari s.n.;* Tjibeureum, 1600 m, *van Steenis 1896; Schiffner 2366; Yates 2978;* Gegerbintang, 1400—2000 m, *van Steenis 11691; den Berger 498;* G. Wayang, 1800—1900 m, *Junghuhn s.n.; Forbes 847;* G. Patuha, 2200—2470 m, *Teysmann & Scheffer s.n.; Korthals s.n.; Lb'rzing 1334, 1402; Koorders 9692; Reinwardt s.n.; van Steenis 6893;* G. Tangkuban Prahu, c. 1800 m, *Docters van Leeuiven 11500; Zollinger 86S; Popta s.n.; Junghuhn s.n.; Holstvoogd 329; Horst s.n.;* G. Masigit, 2050 m, *Backer 12388; G.* Guntur, 1500 m, *Koens 99;* Sindanglaja, *Ploem s.n.;* Garut, c. 1600 m, *Burck s.n.; Bakhuizen v.d. Br. 1660;* "Preanger", *Warburg 3293.* Semarang: G. Telemojo, 1880 m, *Koorders 36015.* Banjumas: G. Slamat, 3100m, *Backer 524.* Pasuruan: G. Ardjuno (Kembar), 2600—3000m, *Arcns s.n.;*

Lautcrbach 6293; van Steenis 11874; G. Welirang, 2900 m, *van Steenis 7038.* K e d u: G. Sindoro, 3000 m, *Docters van, Leeuwen 8946;* Djieng Plateau, 2300 m, *Backer 21809; Junghuhn s.n.;* K e d i r i : G. Kelud, 1700m, *Coert 1530.*

16. GAULTHERIA ARFAKANA Sleum.

Gaultheria arfakana Sleumer *in* Bot. Jahrb. 72: 215. 1942.—*G. leucocarpa* Bl. var. *papuana* Becc, Malesia 1 : 213. 1878.

NW. NEW GUINEA. Mt Arfak, Hatam, c. 2000 m, *Beccari (Herb. Beccari 5780,* PI, type; *5780* A, B, C) ; .Nettoti, top, 1980 m, *van Roy en 3882.*

17. GAULTHERIA MALAYANA Airy-Shaw.

Gaultheria malayana Airy-Shaw *in* Kew Bull. 1940: 304. 1941; Henders. *in* Mai. Natur. J. 6: 263, */. 246 A, B.* 1950.—*G. fragrantissima (non* Wall.) K. & G. *in* J. As. Soc. Beng. 74, ii: 69. 1906; Ridl. *in* J. Fed. Mai. St. Mus. 6: 49. 1915; PI. Mai. Pen. 2: 212. 1923; Henders. *in* J. Mai. Br. R. As. Soc. 5: 256. 1927.

MALAY PENINSULA. P e r a k : G. Kerbau (Korbu), 1830m, *H. C. Robinson s.n.* (BM; K, type); ibid., ridges above 1650m, *F. Dep. F.M.S. 32117 Symington;* Cameron Highl., 1370m, *Hancock s.n.; Batten Pooll s.n.;* ibid., G. Terbakar, 1370m, *Henderson 10991; F. Dep. F.M.S. 36233 Symington;* G. Batu Brinchang, *F. Dep. F.M.S. 36505 Ja'amat & Yalip;* G. Batu Puteh, summit, *Scortechini 405; Wray 879* (cit. K. & G., not seen), *1580* (cit. K. & G., not seen).

18. GAULTHERIA INTERMEDIA J. J. S.

Gaultheria intermedia J. J. Smith *in* Med. Rijksherb. 30: 1, */. 1, pi.* 1916; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934.

JAVA or SUMATRA: *Junghuhn 96* (L, type).

19. GAULTHERIA HIRTA Ridl.

Gaultheria hirta Ridley *in* J. Fed. Mai. St. Mus. 6: 49. 1915; Fl. Mai. Pen. 2: 213. 1923; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934.

MALAY PENINSULA. P e r a k : G. Kerbau, c. 1525 m, *H.C. Robinson s.n.* (BM; K, type); ibid., c. 1370m, *Haniff* (Herb. *Ridley 16307).*

20. Gaultheria viridiflora Sleum., *nov. spec.*

Frutex c. 1 m altus. Ramuli subteretes, glaberrimi, in sicco saturate brunneo-rubescentes. Folia ovato-oblonga vel ovato-lanceolata, apice sensim acuminata glandulaque terminata, basi cuneata, subcoriacea, supra in sicco olivacea vel brunnea, subtus pallidiora, opaca, glabra, subtus haud punctata, sat regulariter serrata, dentibus ± 1 mm altis et 2—3 mm distantibus glandula obtusatis, 4—5,5(—6) cm longa, (1,7—)2—3 cm lata, costa supra plana vel subimmersa, subtus prominente, in sicco rubescente, nervis lateralibus utroque latere c. 4 alte curvato-ascendentibus interque sese anastomosantibus, supra, parum conspicuis, subtus prominentibus,

venis venulisque sat dense reticulatis, plerumque subtus tantum distinctius elevatis; petiolus incrassatus, glaber, 2—3(—4) mm longus, 1 mm diam. Racemi simplices plerumque axillares, solitarii, interdum axillares et pseudoterminales, graciles, erectiusculi, 8—12-flori, sub plena anthesi jam eperulati. Rhachis ± 0,5 mm diam., sicut pedicelli sat dense brevissime patenter pubescens. Pedicelli 3—5 mm longi, basi bractea lanceolata ciliata 2—3 mm longa, apice infra calycem bracteolis 2 ovatis ciliatis 2 mm longis instructi. Calyx in vivo rubescens, 2,5 mm longus, glaber, lobis ovatis ciliolatis. Corolla subcampanulata, in vivo viridescens, 3,5—4 mm longa, 3(—4) mm lata, fere ad medium 5-loba, glabra, Stamina 10; filamenta linearia papillosa, 1 mm longa; antherae ovato-oblongae c. 1,5 mm longae, tubulis brevissimis dorso breviter biaristatis. Ovarium flavescenti-hirtum; stylus glaber 2 mm longus. Fructus, ut videtur, atroviolaceus, c. 6 mm diam.

C. CELEBES. Enrekang, ridge Batubollong-Madjadja, arid, sandy ridge NNW Madjadja, open country, 2900 m, fl. green-white, base reddish, 24-6-1937, *Eyma 957* (L, type), *968;* Latimodjong Mts, Rantemario, 2700 *m,* frequent, fl. 6-1929, *Kjellberg 3791* (S) ; between Tinabang and Rante Mario, 3000—3300 m, fl., fr. 17-6-1937, *Eyma 681.*

21. GAULTHERIA PULLEI J. J. S.

Gaultheria pullei J. J. Smith *in* Med. Rijksherb. 25: 7. 1915; Nova Guinea 12 (5): 513. 1917; *I.e. t. 207.* 1918; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934; Sleum. *in* Bot. Jahrb. 72: 214. 1942.—*G. calycidata* Wernh. *in* Trans. Linn. Soc. 2. ser. Bot. 9: 93. 1916; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934.—*G. fragrantissima* Wall. var. *papiiana* J. J. S. *in* Nova Guinea 12 (2): 143. 1914; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934.

21a. var. PULLEI.

NEW GUINEA. W. p a r t : Mt Goliath, 3200—3450 m, *de Kock 67* (BO, type of *G. fragrantissima* var. *papuana), 82, 157;* Mt Treub, 2400 m, *Pulle 1108* (K; L, type *of G. pullei;* U); Utakwa River to Mt Carstensz, 2530—3200 m, *Kloss* (BM, type of *G. calyculata) ;* Mt Wilhelmina, 11 km NE of Wilhelmina top, 3450 m, *Brass & Meyer Drees 9763;* Lake Habbema, 3225m, *Brass 9051.* NE. p a r t : Morobe Distr., Mt Saruwaged, Samanzing, 2500—2600 m, *Clemens 9375;* Ulap trail, *Clemens U1139.* C. H i g h l a n d s : behind Nondugl, Bismarck Mts, Wahgi valley watershed, 2745 m, *Gilliard s.n.;* SE. p a r t : Centr. Distr., Wharton Range, Murray Pass, 2840 m, *Brass 4621;* Mt Tafa,.235O—2700m, *Brass 4066, 4176, 4849.*

21b. var. leiotheca (Sleum.) Sleum., *stat. nov.*

Gaultheria leiotheca Sleumer *in* Bot. Jahrb. 72: 213. 1942.

NEW GUINEA. SE. p a r t : Centr. Distr., Mt Ganeve, c. 2600m, *Carr 15292* (A; B, type, f; BM, K, L, SING). NE. p a r t : Rawlinson Range, 2135—3655m, *Clemens 12315 bis, 41388.*

22. GAULTHERIA LEUCOCARPA Bl.

Gaultheria leucocarpa Blume, Bijdr. 856. 1826; G. Don, Gen. Syst. 3: 840. 1834; DC, Prodr. 7: 593. 1839; Hassk., Cat. Hort. Btzg 160. 1844; Zoll. *in* Nat. Geneesk. Arch. N.I. 2: 9. 1845; Moritzi, Syst. Verz. Zoll. 42. 1846; 'Zoll., Syst. Verz. 2: 138. 1854; Miq., Fl. Ind. Bat. 2: 1056. 1859; Ann. Mus. Bot. Lugd.-Bat. 1: 41. 1863; Koord. *in* Nat. Tijd. N.I. 60: 264. 1901; *I.e.* 63: 41. 1904; K. & G. *in* J. As. Soc. Beng. 74, ii: 70. 1906; Ridl. *in* J. Fed. Mai. St. Mus. 4: 44. 1909; Koord., Exk. Fl. Java 3: 9. 1912; Koord.-Schum., Syst. Verz., Fam. 233, p. 107. 1912; Back, *in* Bull. Jard. Bot. Btzg II, 12: 16. 1913; J. J. S. *in* K. & V., Bijdr. Booms. 13: 117. 1914 *ind. f. fflabra, nom. nud.;* Koord., Fl. Tjib., Fam. 233, p. 6. 1918; Ridl. *in* J. Mai. Br. R. As. Soc. no 87: 75. 1923; Fl. Mai. Pen. 2: 212. 1923; Sp. Moore *in* J. Bot. 63: Suppl. 57. 1925; Hochr. *in* Candollea 2: 494. 1925; Heyne, Nutt. PI. 1218. 1927; Renders, *in* J. Mai. Br. R. As. Soc. 5: 256. 1927; Steen. *in* Arch. Hydrobiol. Suppl. 11: 317, *I. 25* (veg.). 1932; Doct. v. Leeuw., Pangrango 200, *I. 43.* 1933; J. J. S. *in* Merr. *in* Contr. Arn. Arb. 8: 127. 1934; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934; Amshoff *in* Back., Bekn. Fl. Java (em. ed.) 7 b, fam. 162, p. 5; Steen. *in* Bull. Jard. Bot. Btzg III, 17: 388. 1948; Henders. *in* Mai. Nat. J. 6: 264. *I. 246C* (leaf). 1950.—*Brossaea leucocarpa* (Bl.) O. Ktze., Rev. Gen. PL 2: 388. 1891.

22a. f. LEUCOCARPA

Gaultheria leucocarpa Bl. with white fruits occurs in Java in two forms, one with completely glabrous, the other with densely short-pilose inflorescences. These forms, as far as can be judged from herbarium specimens at hand, seem to exclude each other in most of the places where they have been found, and no intermediates have been observed. It seems therefore desirable to distinguish two forms taxonomically, as J. J. Smith and Hochreutiner did before.

Blume attached the name *G. leucocarpa* to both forms in the herbarium ; his very short description does not mention any pubescence. Therefore the glabrous form has been chosen by me as the type from Blume's type-material in the Leyden Herbarium.

This 'typical' form with glabrous inflorescences and white fruits seems not to occur in the Malay Peninsula, from where the collectors only mention dark fruits; in cases where no fruit colour is stated on the labels, the fruits are dark when dry. Specimens from Malay Peninsula which bear glabrous inflorescences but no fruits, therefore are listed under f. *cumingiana.* For Sumatra and Java, however, all specimens having glabrous inflorescences but no fruits, or without the indication of the colour of the fruit on the labels, are enumerated under f. *leucocarpa;* it is possible that a part of them belongs to f. *cumingiana.*

SUMATRA. At.] eh: Laut Pupandji, 2000m, *van Steenis. 6521;* Bur ni Telong, 1100 m, *van Steenis 6108.* E a s t c o a s t : Redelong Volcano, 1100—1830 m, *Bang ham 907,* p.p.; Asahan, *Bartlett & ha Rue 498;* Simelungun, *Yates 1961; Keers 35;* Dolok Pintau, 2000 m, *Frey-Wyssling 12;* Seribu Dolok, 1420 m, *Lorzing 9819.* T a p a n u l i: Balige, *van de Koppel 6;* Toba Highland, 1200—1500 m, *Posthumus s.n.;* Dolok Sangul, 1300 m, *Huitema 76.;* Huta Gindjang, *Ruttner 46;* Tor Dabolon, *Bartlett 7879* p.p.; Habinsaran, 1300 m, *Lörzing 6629;* G. Singgalang, *Beccari P.S. 286* p.p. W e s t e o a s t : G. Kerintji, 2200—2400 m, *Biinnemeijer 9666, 10075, 10146, 10439.*

JAVA. D j ak a r t a/P r e a n g e r: G. Salak, 2100*—2215 m, *Z oiling er 1711; Koorders 25969, S2017, 32152, 36741, Docters van Leeuwen 14039; van Steenis 2986;* Tjibodas, 2200—2400 m, *Koorders 15626, 15640, 31765; de Monchy s.n.; Scheffer s.n.; Raap 774;* G. Pangrango, 2600—3020 m. *Palmer & Bryant 997; Koorders 31775; Reijnvaan 125; Backer 22353; Yates 2753; Schiffner 2362, 2367; J.J. Smith s.n.; van Steenis 5200, 17619;* G. Gede, 2100—2800 m, *Backer 3244, 3294, 31305; den Berger 646; Braskamp s.n.; Hallier 435; Reinwardt s.n,; Clemens 30,427'; O. Kuntze 4642; Palmer & Bryant 1117; van Steenis 1998, 10617, 12564; Scheffer s.n.; Docters van Leeuwen 8714 a; Bakhhuizen v.d. Br. 53, 64; Burck s.n.; Hub. Winkier 1815; de Voogd 736; Sapiin 237; Lorzing 2178;* Mt Malabar, *Anderson 151* p.p.; G. Papandayan, *Scheffer s.n.;* Sindanglaya, *Ploem s.n.; Hullett s.n.* P e k a l o n g a n : G. Ragadjembangan, 2600m, *Backer 16143.* M a d i u n : G. Lawu, *Waitz s.n.;* Locality not given (probably from West Java): *Blume s.n.;* (L, lectotype of *G. leucocarpa); Lobb 41.*

22b. var. HIRTA Val.

Gaultheria leucocarpa Bl. var. *hirta* Valeton *ex* J. J. Smith *in* Bull. Jard. Bot. Btzg III, 13: 454. 1935.

SUMATRA. T a p a n u l i : Batak Toba near Kuta Lekole, *Pringgo Atmodjo 515* (L, type).

22c. f. cumingiana (Vid.) Sleum., *stat. nov.*

Gaultheria cumingiana Vidal, Phan. Cuming. Philip. 184. 1885; Rev. PI. Vase. Filip. 170. 1886; Merr. *in* Philip. J. Sc. 2: Bot. 292 *p.p.* 1907; *I.e.* 3: Bot. 378. 1908; En. Philip. 3: 246 *p.p.* 1923; Lingn. Agr. Rev. 4: 132. 1927; Copel. f. *in* Philip. J. Sc. 47: 61, *pi. 1 f. 2.* 1932.—*G. laxiflora* Diels *in* Bot. Jahrb. 29: 515. 1900.—G. *yunnanensis* (Franch.) Rehd. *in* J. Arn. Arb. 15: 282. 1934, et syn. alt.—*G. crenulata (non* Kurz) J. J. S. *in* Merr. *in* Contr. Arn. Arb. 8: 127. 1934; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934; Fletcher, Fl. Siam. En. 2: 315. 1938.—*Vaccinium yunnanense* Franch. *in* Morot, J. de Botan. 9: 368. 1895.

UPPER BURMA. Naung-chaung — Nwai Divide, *K. Ward 1840;* Hpimaw Hill, *Farrer 1324.*

CHINA: Kwangsi, Kwangtung, Kweichow, Yunnan, Szechuan, Hunan, Fukien.

INDOCHINA. T o n k i n : prov. Caobang, massif du Piahouac, 1300m, *Poilane 19115* (L, P).

FORMOSA. Mt Taihei, c. 1500—1600 m, *Bartlett 6063* (L).

SIAM. P a y a p : Chiengmai, Doi Lang Ka, *Put 3757.*

MALAY PENINSULA. P e r a k: 'Top of high rocks, 300—400 ft'. *Kunstler 8025* (BM). P a h a n g : Cameron Highl., 1465—1585m, in swamps, *Henderson SF 23292; Vesterdal 367; F. Dep. F.M.S. 11542 Watson;* ibid., Taman Sedia, 137am, *F. Dep. F.M.S. 20981 Symington;* ibid., Batu Brinchang, 1980 m, *F. Dep. F.M.S. (KEP) 36510 Ja'amat.*

SUMATRA. Eastcoast: foot of Sibajak volcano, 1600m, *Ba.ngh.am 993;* Deleng Siosar, Karo Highland, 1400—1500 m, *Lb'rzing 8605;* Simalungan, Aekanuli distr., rim of crater on E side of Toba Lake, 1220—1830 m, *Bangham 1291.* Tapanuli: Prangonan, Toba, 1100m, *Ouwehand 65;* Huta Gindjang, NW of Balige, *Bartlett 8355.* Palembang: Mt Dempo, 2900—3300 m, *Forbes 2383; de Voogd 385; Jacobson 524; Brooks 15908.* Lampong: G. Tenggamus, 2000 m, *Forbes 1873', Lieftinck 14.*

JAVA. Madiun: Sungi pait, Widodaren (Tengger), *Zoilinger 284.1* p.p. (L, *'G. bandongensis').* Besuki: Idjen plateau, 1250—1800 m, *Zollinger 2841* p.p. (A, BO) ; *Backer 25244; Koorders 19932.*

PHILIPPINES. Luzon: Albay, loco haud ind., *Cuming 926* (A), *934* (cit. *'932',* BM, K, L; MA, type of *G. cumingiana,* not seen; MEL); Mt Mayon, 2100 m, *Vidal 818; B. Sci. 6500 Robinson* (cit. Copel., not seen), *B. Set. 2923 Mearns* (not seen). Laguna, Mt Banahao, 2250 m, *Loher 6200; F.B. 7896, 8009 Curran & Merritt* (not seen) ; *B. Sci. 9846 Robinson* (not seen) ; Mt San Cristobal, *Gates 6375* (not seen). Zambales, Mt Pinatubo, *Clemens 17472.* Mountain, Benguet, *Loher 3782, 3783* (not seen); Mt Santo Tomas, 2285m, *Elmer 6253; Williams 951, 1331; Santos 5804; F.B. 4958 Curran* (not seen) ; *F.B. 14170 Merritt; Sandkuhl 330* (not seen) ; *Merrill 11735; McClitre 16050* (not seen); Baguio, *Hancock 89; Elmer 8589; Sevrens 21* (not seen); Baguio to Ambuklao, *Merrill 4376;* Pauai, *B. Sci. Mearns 4277; F.B. 14444 Darling* (not seen), *B. Sci. 8417 McGregor* (not seen); *Clemens 9190; B. Sci. 31785 Santos; B. Sci. 82399 Quisumbing & Sulit;* Pauai to Mt Data, *Clemens 16392;* Mt Data, *Micholitz s.n.; Loher 5049;* Baguio-Bontoc road, km 21, 1800 m, *PNH 20376 Mendoza;* Mt Pulog, *PNH 4307 Celestino;* Bugias, *Merrill 4672;* Batan, *B. Sci 5891 Ramos;* Bucao, *F.B. 14424 Darling* (not seen). Lepanto, Highland of Lepanto, 1525—2135m, *Whitehead s.n.;* Lepanto, *Vidal 1829;* trail to Balbalasan, *F.B. 5698 Klemme* (not seen). Bontoc: Barrio Agawa, Besao, Datakan, 915—975 m, *Santos 5504.* Bontoc, *Vanoverbergh 748* (not seen). Ifugao, Mt Polis, *B. Sci. 37619 Ramos & Edafio.*

NOTE. In the specimens from China, Formosa, and the Philippines the leaves are mostly less deeply serrate-crenulate than in those from Tonkin, Siam, the Malay Peninsula, Sumatra, Java, and Bali. Also in a part of the specimens from China the leaves are less ovate resp. less cordate than in the proper Malaysian ones. In the essential characters, however, there are no differences between the materials cited above under */. cumingiana.*

Gaultheria crenulata Kurz, described from Yunnan, has been considered by various authors to occur in Malaysia; apparently belonging to *G. leucocarpa* Bl. in a broad sense and probably better merged in it as a var., *G. crenulata* Kurz is different from all Malaysian varieties and forms of *G. leucocarpa* in its indument-characters.

22d. f. SCANDENS Hochr.

Gaultheria leucocarpa Bl. f. *scandens* Hochreutiner *in* Candollea 2: 494. 1925.—?*G. bandongensis* >Zoll., Syst. Verz. 2: 138. 1854, *nom.nud.;* Zoll. *ex* Miq., PL Ind. Bat. 2: 1056. 1859, descr.—?G. *leucocarpa* Bl. var. *seminuda* J. J. S. *in* Bull. Jard. Bot. Btzg III, 13: 455. 1935.—*G.leucocarpa* Bl. f. *pubeseens,* J. J. S. *in* K. & V., Bijdr. Booms. 13: 119. 1914, *nom. nud.*—*IBrossaea bandongensis* (Zoll. *ex* Miq.) O. Ktze., Rev. Gen. PL 2: 388. 1891.

The f. *scandens* which combines pubescent inflorescences with white fruits, seems not to occur in the Malay Peninsula, as in all specimens of that region, where the inflorescences are pubescent, the fruits are dark red, resp. reported to be dark red on the labels by the collectors. Specimens from the Malay Peninsula with pubescent inflorescences, bearing no fruits, therefore are recorded under f. *melanocarpa.* For Sumatra and Java, however, all specimens with pubescent inflorescences, and no indication of the fruit colour, are enumerated under f. *scandens;* it is probable, that some of them belong to f. *melanocarpa,* especially from localities for which the latter is; known.

Of *G. bandongensis* and *G. leucocarpa* var. *seminuda* the fruits are unknown, and therefore no decision is possible at the moment, whether the material, on which these names are based, belong either to f. *scandens* or to f. *melanocarpa.,* before new and complete material is collected in the correspondent type localities. The long spreading bristle-like hairs on the lowest parts of the specimens described as var. *seminuda* indicate a juvenile state of these plants; the same hairs have been observed on young specimens from Java and the Philippines.

The name *'Gaultheria bandongensis'* is attached to Zollinger 2841 x, 'ex pr. Bandong' in Zollinger, Syst. Verz. 2:138.1854, without a description; specimens of 2841 x, named *G. bandongensis* by Zollinger himself, have been seen by me from the Paris Herbarium and from the Arnold Arboretum ; they have densely pubescent inflorescences, but no fruits and belong to f. *scandens.* (or possibly f. *melanocarpa).* The plant described by Miquel in Fl. Bat. 2: 1056. 1859 as *G. bandongensis* Zoll. with 'in Bandong' as locality, is preserved in. the Utrecht Herbarium and completely identical with the above mentioned material; the label, however, bears no Zollinger collector's number. Zollinger 2841 (without V), in Zollinger's Syst. Verz. is said to be collected 'inter rupes ad rivulum (Sungi) pait, Idjen, 500 ft.'. Apparently the material of this number has been collected in different localities. The specimen of 'Zollinger Herbarium venale 2841' in the Leyden Herbarium bears the label *'G. bandongensis!* In decliv. Sungi pait ad M. Widodaren, bacca nigra, 22—X—58'. This specimen is completely glabrous. Another specimen of Zollinger 2841 in the Bogor Herbarium states in Zollinger's handwriting *'G. leucocarpa.* Bacca nigra, ad-ripas rivularom montosis Idjen, ± 4000 ft., 30-4-45.' Other speci-

mens of Zollinger 2841 in various herbaria are labelled *'G. leucocarpa'*, without locality. All these 2841-numbers are glabrous and belong to f. *cumingiana.*

SUMATRA. Atjeh: Mt Losir, 2300 m, *van Steenis 868S; G.* Peëut Sago, 2300 m, *Gall 87.* Eastcoast: Redelong volcano, 1095—1830 m, *Bangham, 907* p.p.; Sibolangit, 1900—2210 m, *Lörzing 6131, 8252;* G. Sibayak, 1900—2000 m, *Lörzing 8301; Stomps s.n.; van der Meer Mohr 5048; Bartlett 6515; G.* Pinto, *Hamel & Rahmat Si Toroes 595; F. Dep. F.M.S. 24669 Symington;* Berastagi, *Ridley s.n.;* G. Sinabung, *F. Dep. F.M.S. 24700 Symington; Bartlett 8643;* Dolok Marpalatuk, 1700 m, *Batten Pooll s.n.;* locality not given: *Yates 96, 1502.* Tapanuli: summit of Dolok Surungan, *Bartlett 7996;* Habinsaran, Tor Dabolon, *Bartlett 7879* p.p.; Gudarim Baru, 1000—1300 m, *Junghuhn 96* (L, lectotype of var. *seminuda).* Westcoast: G. Singgalang, 2700—2800 m, *Beccari P.S. 186, 286* p.p. (L, syntype of var. *seminuda); W. Meijer 3892; Yates 2456; Biinnemeijer 2846;* Mt Ophir (Talakmau), 1500—2800 m, *Homer s.n.; Biinnemeijer 693, 801, 834, 955, 976;* G. Talang, 2300—2400 m, *Biinnemeijer 5252, 5509;* G. Merapi, 2300—2500 m, *Sehiffner 2371; Biinnemeijer 4750.* 'Sumatra': *Korthals s.n.* (L, syntype of var. *seminuda).*

JAVA. Djakarta/Preanger: G. Wajang, *Forbes 721; Rant & Smith* s.n.; G. Papandajan, 2000—2400 m, *Sehiffner 2370; Hochreutiner 2132* (G, type of f. *scandens,* not seen), *Ridley s.n.; Junghuhn s.n.; Boerlage s.n.; Kjellberg s.n.; Koorders 41585; Scheffer s.n.; Korthals s.n.; Backer 5560; Koens 474bis;* Pangentjongan, 1700 m, *Koorders 1813, 26478;* G. Kendang, *van Rijckevorsel 60;* G. Guntur, 900—1800 m, *Kerkhoven 25, Koens 109, 377, 414;* Bandung, Telaga Putih, *Docters van Leeuwen s.n.;* Garut, *Burck 164, 417;* G. Sunda, 1900 m, *Bakhuizen v.d. Br. 4603;* Mt Malabar, *Forbes 957; Anderson 151* p.p.; G. Patuha, 2100—2200'm, *Korthals s.n.; Hildebrandt 235; Lorzing 1333; Backer 12752; Hardon 9;* Telagabodas, *Korthals s.n.;* Tangkuban Prahu, 1800—1900 m, *Popta 13, Holstvoogd 330, Docters van Leeuwen 11458;* 'Preanger', *Warburg 3295.* "prov. Bandung", *Zollinger 2841 x* (A, P; U, type of *G. bandongensis).* Pekalongan: G. Slamat, 1400m, *Brinkman 857;* Petung Kriana, 1500—1600 m, *Backer 15970;* G. Prahu, Wonosobo, 2200 m, *Brinkman 205;* Djieng plateau, 2200 m, *Vorderman s.n.; Backer 21810; Rant s.n.;* Cheribon: G. Tjerimai, 2000—3000 m, *Backer 5092; Vermeulen 36; van der Meer Mohr 28; Docters van Leeuwen 2521.* Kedu: G. Sindoro, 3100m, *Docters van Leeuwen 8898, Junghuhn s.n.;* G. Sembung&n, *Blokhuis 20;* G. Sumbing, 2000 m, *Lörzing 39; Loogen s.n.;* G. Merbabu, 1900—2400 m, *Backer 30265; Coert 136; den Berger 90; Bilsgen 187; G.* Merapi, 1700—2000m, *de Haan 159; Junghuhn 97; Hemken 12.* Semarang: G. Telemojo, 1500—1800 m, *Koorders 27855, 36014* (cit. *'39614'), 36016; Docters van Leeuwen 165;* G. Ungaran, 2050 m, *Docters van Leeuwen 2089.* Malang: Tengger, 2000—2500m, *Koorders 37510—14, van der Meer Mohr s.n.; Kobus s.n.; Kobus & Lotsy s.n.* Madiun: G. Lawu, 2200m, *Rant s.n.;* G. Lamongan, 900—1600m, *Altmann 153, Bijhouwer 205, van Steenis 10674.* "Java", no locality given: *Korthals s.n.* (BO, "f. *pubescens"), Blume s.n.; Horsfield 47.*

22e. f. MELANOCAEPA J. J. S.

Gaultheria leucocarpa Bl. f. *melanocarpa* J. J. Smith *ex* Amshoff *in* Back. Bekn. Fl. Java (em. ed.) 7 b fam. 162, p. 5. 1948.—*G. leucocarpa* Bl. var. *melanocarpa* J. J. S. *ex* Steen. *in* Bull. Jard. Bot. Btzg III, 17: 388. 1948, in text.—*G. leucocarpa* Bl. var. *melanocephala* J. J. S. *ex* Steen. *in* Arch. Hydrobiol. Suppl. 11: 317. 1932, in text.

MALAY PENINSULA. Perak: locality not known, *Scortechini 1348;* G. Bintang, *F.M.S. Mus. 13003;* G. Kerbau, 2135 m, *Haniff* (Herb. *Ridley 16308;* Cameron Highl., *F. Dep. F.M.S. 27020 Ja'amat;* G. Brumbun, 1525—2135 m, *Henderson F.M.S. Mus. 11681; Ridley 13695; Wray 1573;* Foster's Hill, 1465 m, *Henderson SF 17846.* Pahang: G. Terbakar, 1370 m, *Henderson F.M.S. Mus. 10983;* Sg. Lemoi, *F. Dep. F.M.S. 28121 Ja'amat;* Ulu Telom, Ulu Perla, *F. Dep. F.M.S. 27613 Dolman;* Frazer Hill, *F. Dep. F.M.S. 32271 Symington.*

SUMATRA. Eastcoast: Sinabung, N. slope, Sibolangit, 1850—2470m, *Lörzing 5992, 8153;* G. Sibajak, 1900 m, *Docters van Leeuiven 12867;* G. Pinto, upper slopes, *Hamel & Rahmat Si Toroes 597.* Bengkulen: Lebong, 1000 m, *de Voogd 1161;* G. Kawa, *de Voogd 512.*

JAVA. Madiun: G. Lawu, *Teijsmann s.n.* Malang: G. Smeru, *Loogen s.n.; G.* Lamongan, *Jesiviet s.n.;* G. Tengger, *Mousset 854.* Besuki: G. Hijang, 2600—3000 m, *Backer 9731; Bremekamp 9831;* summit of Mt Argopuro, 3020 m, *Koorders 43670* (BO, lectotype of f. *melanocarpa;* L).

22f. var. psilocarpa (Copel. f.) Sleum., *stat. nov.*

Gaultheria psilocarpa Copeland f. *in* Philip. J. Sc. 47: 62, *pi. 1 f. 3.* 1932.—*G. cumingiana (non* Vid.) Merr. *in* Philip. J. Sc. 2: Bot. 292. 1907 p.p.; Elm., Leafl. Philip. Bot. 3: 1091. 1911; Merr., En. Philip. 3: 246. 1923 p.p.

FORMOSA. *Price 789; Wilson 11239.*

PHILIPPINES. Mindanao: Bukidnon, Mt Candoon, 1800m, *B. Sci. 38903 Ramos & Edaño* (A, BM, BRI, L; PNH, type, f) ; Davao, Mt Calelan, 2800 m, *Elmer 11678.* Negros: Canlaon Volcano, *Merrill 235.* Mindoro: Mt Halcon, *Merrill 5725.* Luzon: Laguna, Mt Maheyhey, *Lobb s.n.* (K).

23. GAULTHERIA NOVAGUINEENSIS J. J. S.

Gaultheria novaguineensis J. J. Smith *in* Med. Rijksherb. 25: 5. 1915; Nova Guinea 12: 512. 1917; *I.e., t. 206.* 1918; Steen. *in* Bull. Jard. Bot. Btzg III, 13: 205. 1934; Sleum. *in* Bot. Jahrb. 72: 213. 1942.

23a. var. NOVAGUINEENSIS

NEW GUINEA. W. part: Wichmann Mts, 3000m, *Pulle 990* (K; L, type, U). Oranje Mts, Waterval-bivak, 3400—3500 m, *Versteeg 2478;* 2 km E of Wilhelmina top, 3700 m, Brass *& Meyer Drees 10114-*

23a. var. pascua Sleum., *nov. var.*

Ovario in vertice subdense breviter griseo-pubescente, rhachide pedicellisque sat dense brevissime pubescentibus diversa. Flores desunt. Pedicelli fructiferi (7—)8—10 mm longi.

NEW GUINEA. Western part: Mt Carstensz, camp XV a, "Carstenzweide", c. 3700m, fr. Nov.-Dec. 1936, *F. J. Wissel 167* (BO, type; L, fragm.).

24. **Gaultheria pernettyoides** Sleum., *nov. spec.*

Frutex, ut videtur prostratus, ramulis tenuibus (1 mm) teretibus dense subadpresse setulosis, setulis superne filiformibus, basi manifeste incrassatis. Folia lanceolata, rarius subelliptico-lanceolata, apicem ramulorum versus paullo decrescentia et subsessilia, apice basique attenuate, apice ipso subacuta, subcoriacea, in sicco supra saturate brunnea, subtus pallidiora, opaca, regulariter serrulate, dentibus caduce ciliatis minutis 0,2—0,3 mm altis, c. 1 mm distantibus', 0,8—1,3 cm longa, (2—)3—5 mm lata, ad supra costam imprimis inferne minutissime puberula, subtus hie inde setula conspicua instructa, ceterum glabra, costa supra levissime immersa, subtus paullo prominente, nervis lateralibus utroque latere 2 alte ascendentibus supra levissime impressis, subtus parum distinctis vel prominulis, reticulatione ± obscura; petiolus glaber, c. 1 mm longus. Flores axillares solitarii, sparsi, remoti. Pedicelli recurvati, glabri, crassiuseuli, c. 2 mm longi, basi ebracteati, apice infra calycem bracteolis. 2 oppositis ovato-acuminatis c. 2 mm longis instructi. Calyx 2,5 mm longus, profunde 5-partitus, extus glaber, lobis ovatis abrupte acuminatis apice ciliolatis intus brevissime pubescentibus. Corolla et stamina haud visa. Ovarium in vertice brevissime manatissime pubesens; stylus glaber, 2 mm longus. Calyx fructiferus parum auctus, inferne subcarnosus, superne pergamaceus, capsulam depresso-globosam glabram includens.

SUMATRA. Atjeh: Gajo and Alas Lands, Mt Losir, from bivouac 6 to 8, mountain heath, 2950—3460 m, defl. et fr. 5/6-2-1937, *van Steenis 8648* (A, K; L, type).

EXCLUDED

Gaultheria blumei F. v. M. *in* Trans. R. Soc. Viet. 1 (2) : 21. 1889, in text.

F. van Mueller says on p. 21: "G. *blumei (Vaccinium microphyllucm* Bl. Bijdr. 851) has according to the notes of Beccari and Clarke somewhat larger and blunter leaves, seemingly never racemous flowers, blunter calyx lobes, again tubulated anthers, and may differ in further characteristics."

Although F. van Mueller gives *Vaccinium microphyllum* Bl. as a basionym of *Gaultheria blumei,* which thus, in a strict and formal sense, becomes a superfluous name of Blume's species, we might, of course, conclude from the added text, that F. v. Mueller means Blume's species in the sense of Clarke *in* Hook, f., Fl. Br. Ind. 3: 458. 1882, the apparently only source of information for him. Unfortunately, Clarke has made a double mistake: the plant he describes under the name of *Diplycosia microphylla* "Becc." is *not* identical with Beccari's species, and *Diplycosia microphylla* Becc. is *not* based on *Vaccinium microphyllum* Bl., but has been described independently as a new species by Beccari. In the Kew Index *G. blumei* is considered a valid new name for *Diplycosia microphylla*

Becc. in case this species is transferred to *Gaultheria,* because of *Gaultheria microphylla* Hook. f. 1847.

I prefer to consider *G. blumei* a superfluous name of *Vaccinium microphyllum* Bl. The correct name for *Diplycosia microphylla {mm* Becc.) Clarke then becomes *Diplycosia elliptica* Ridley 1920.

Gaultheria heterophylla (Bl.) Endl. *ex* Hassk., Cat. Hort. Btzg 160. 1844 = *Diplycosia heterophylla* Blume 1826.

Gaultheria latifolia (Bl.) Endl. *ex* Hassk., Cat. Hort. Btzg 160. 1844 = *Diplycosia heterophylla* Bl. var. *lati folia* (Bl.) Sleum. 1957 *(D. latifolia* Bl. 1826).

Gaultheria luzonica A, Gray *in* Proc. Am. Ac. Arts. Sc. 5: 324. 1861 = *Diply&osia luzonica* (A. Gray) Merr. 1907.

Gaultheria pilosa (Bl.) Endl. *ex* Hassk., Cat, Hort. Btzg 160. 1844 = *Diplycosia pilosa* Bl. 1826.

INDEX TO COLLECTORS AND NUMBERS

The numbers collected in the series B.Sci., P.B., F. Dep. F.M.S., N.G.F. and P.N.H. have been listed under these abbreviations. The numbers collected in other series have been listed under the collector's names. There is referred to the numbers of species. •

Brooks 15908: 22c.
B. Sci. 2923: 22c; *4277*: 22c; *4283*: 1; *4286*: 1; *5891*: 22c; *5955*: 1; *6500*: 22c; *8417*: 22c; *8421*: 1; *9846*: 22c; *31785*: 22c; *31839*: 1; *37619*: 22c; *38903*: 22f; *44977*: 1; *82377*: 1; *82399*: 22c.
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Büsgen 187: 22d.

Carr 15292: 21b.
Clemens 5890: 11; *5891*: 11; *5892*: 11; *7289A*: 11; *9190*: 22c; *9206*: 1; *9375*: 21a; *9505A*: 11; *9552A*: 11; *9598A*: 11; *9958*: 11; *12315*: 21b; *12319*: 11; *16392*: 22c; *16393*: 1; *17472*: 22c; *18778*: 1; *27788*: 1; *29861*: 1; *29954*: 1; *30427*: 22a; *30428*: 10; *30429*: 15; *32328*: 1; *41139*: 21a; *41140*: 11; *41388*: 21b; *41389*: 11; *50867*: 1; *51405*: 1.
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A NOTE ON THE POLLEN OF WHITEODENDRON AND KJELL-BERGIODENDRON (MYRTACEAE)

by

KATHLEEN M. MCWHAE * (née Pike)

SUMMARY

A description has been given of the pollen grains of *Whiteodendron moultonianum* and *Kjellbergiodendron celebicum.* After this the relationships of both are discussed.

INTRODUCTION

The pollen grains of many of the genera of the Myrtaceae were investigated and described by the present author (Pike 1956), but during this investigation material of the genera *Whiteodendron* and *Kjellbergiodendron* was not available. Since the publication of this work Dr C.G.G.J. van Steenis of Leyden has very kindly supplied mature flower buds of *Whiteodendron moultonianum* (W. W. Sm.) Steen. and *Kjellbergiodendron celebicum,* (Koord.) Merr. and the purpose of this account is to record the results of the pollen examination of these additional genera.

DESCRIPTION OF POLLEN GRAINS

The pollen of both species studied conforms with that typical of the Myrtaceae. The grains are free, isopolar to slightly anisopolar, tricolporate, angulaperturate and have a triangular amb.

Whiteodendron moultonianum (W. W. Sm.) Steen. Sarawak, Beecari P.B. 879.

Polar diameter range 5-7 μ, average 6 μ, equatorial diameter range 12-15 μ,, average 13 μ. Parasyncolpate, with conspicuous polar islands, Which are sometimes smaller at one pole than the other. Sides of amb straight to convex. Exine thin less than 1μ., pattern extremely faint, especially in the mesocolpia.

Kjellbergiodendron celebicum (Koord.) Merr. Misool Isl., West New Guinea, Pleyte 1050.

Polar diameter range 8-12μ, average 9 μ ; equatorial diameter range 19-21μ, average 20 μ. Coipi shallow, not syncolpate and often torn around

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